Global Ocean Monitoring and Observing
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION

BioGeoChemical (BGC) Argo

the ocean in color

Andrea Fassbender

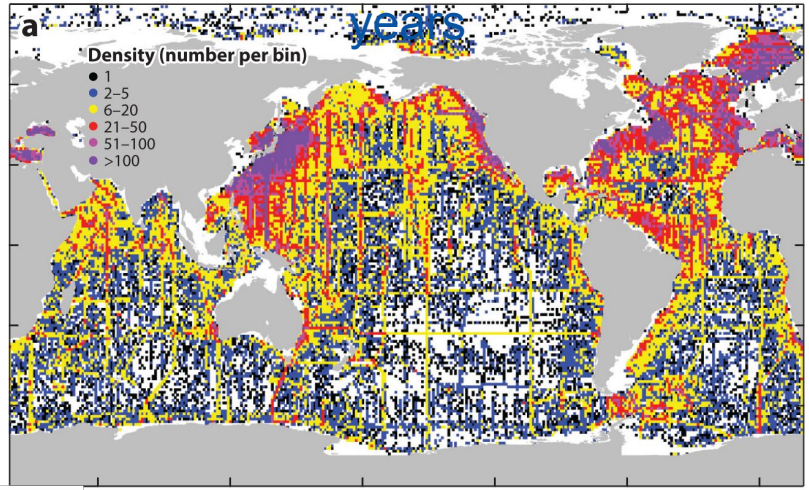
PMEL

GOMO BGC Argo Partners: Emily Osborne (AOML), Greg Johnson & Brendan Carter (PMEL), John Dunne (GFDL), David Nicholson & Susan Wijffels (WHOI), Sarah Purkey, Todd Martz, Lynn Talley, Ariane Verdy, & Matt Mazloff (SIO), Steve Riser & Alison Gray (UW), Ken Johnson (MBARI), …& many more

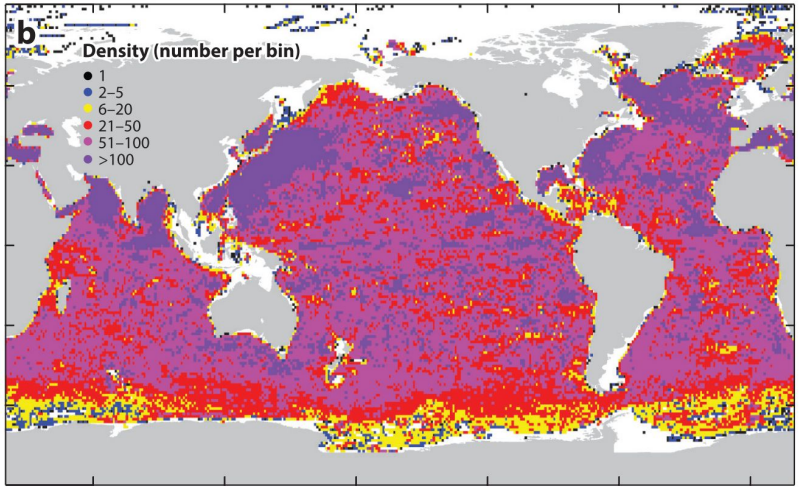
Float image credit: MBARI

Argo Footprint

Shipboard Profiles of Temperature and Salinity to 1,000 m in Past 100 Years



Float Profiles of Temperature and Salinity from 1999 to Feb. 2021



G.C. Johnson et al., 2021 - ARMS

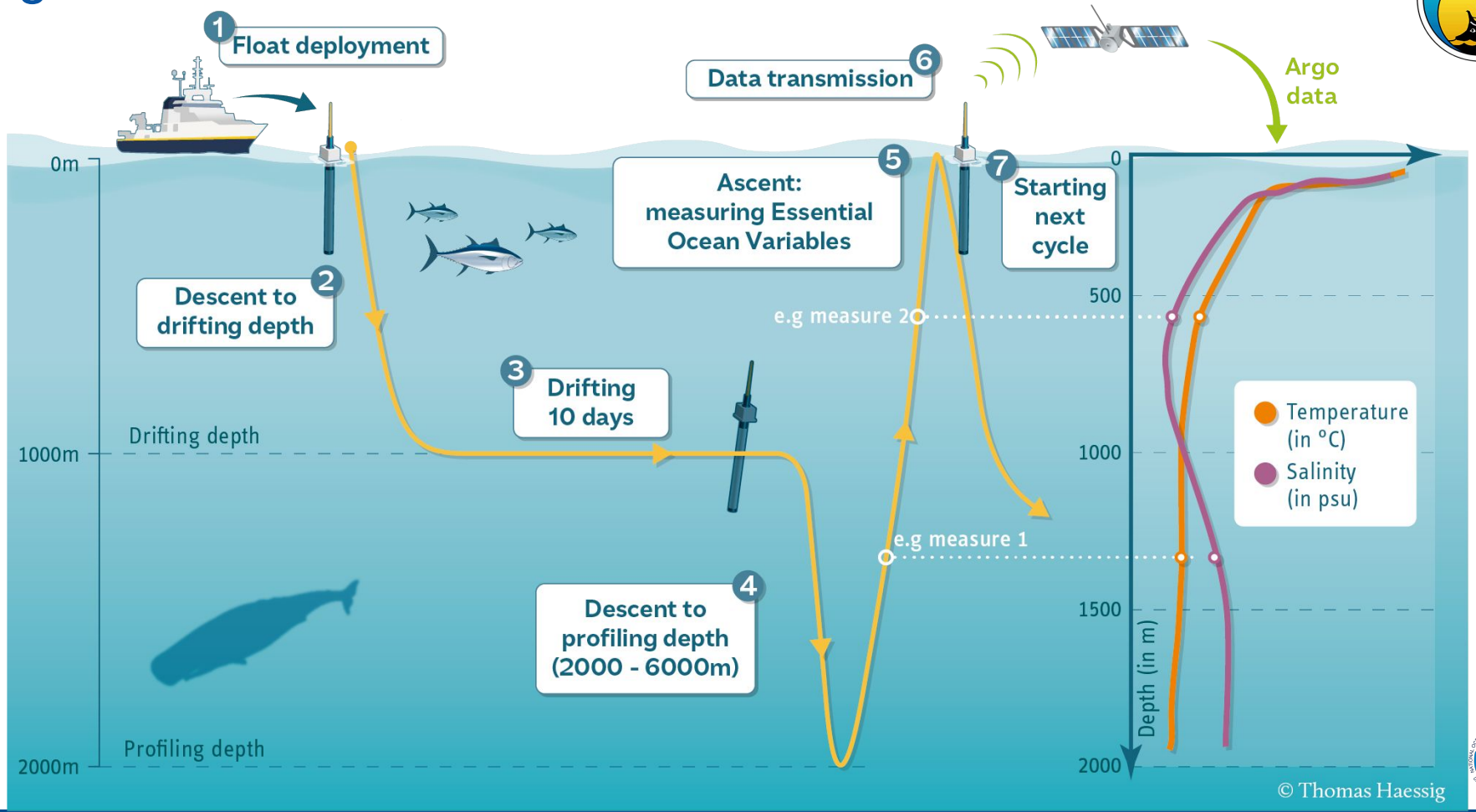
One Argo Vision:

1,000 BGC (468)

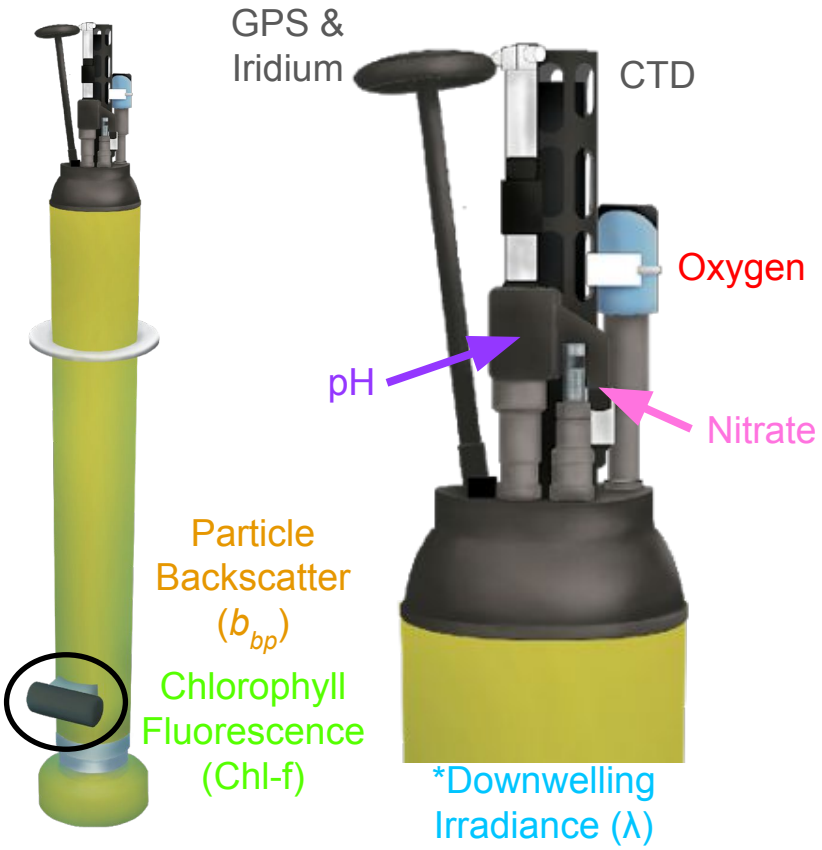
2,350 Core (3,944)

1,250 Deep (179)

Argo Mission

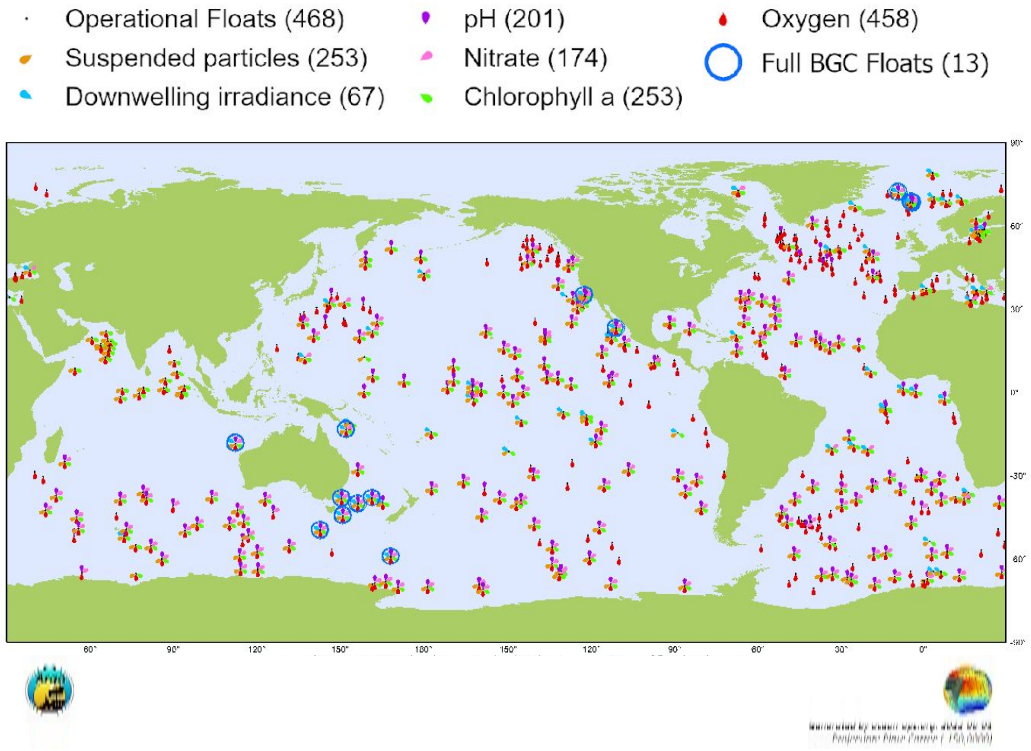


BGC Argo: Observed Parameters

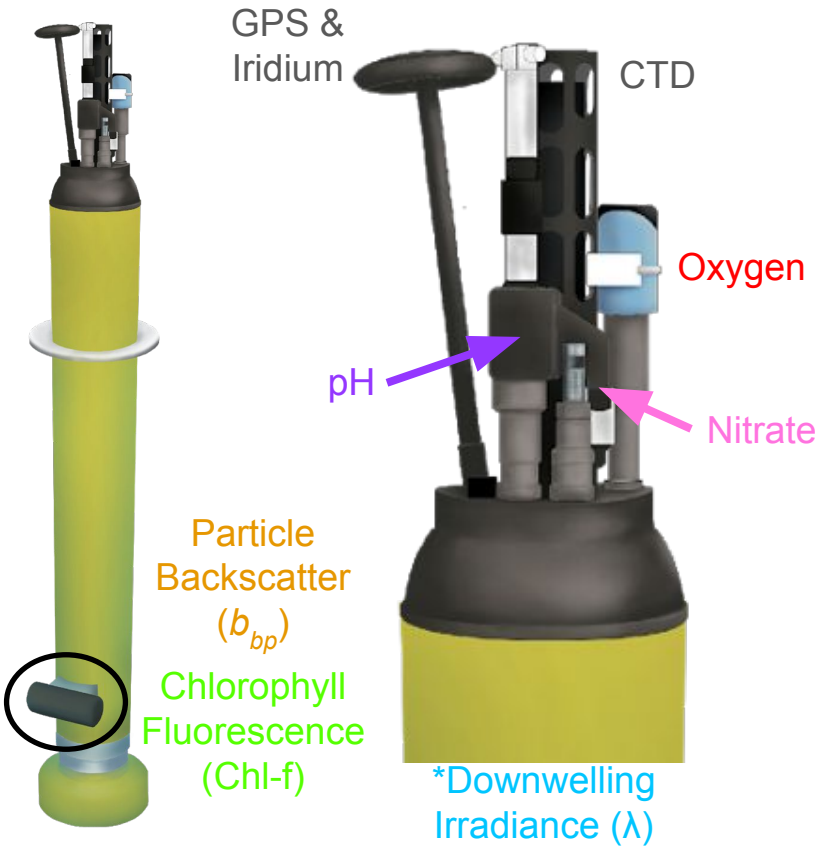


Float image credit: MBARI

BGC Argo May 2022



BGC Argo: Derived Variables

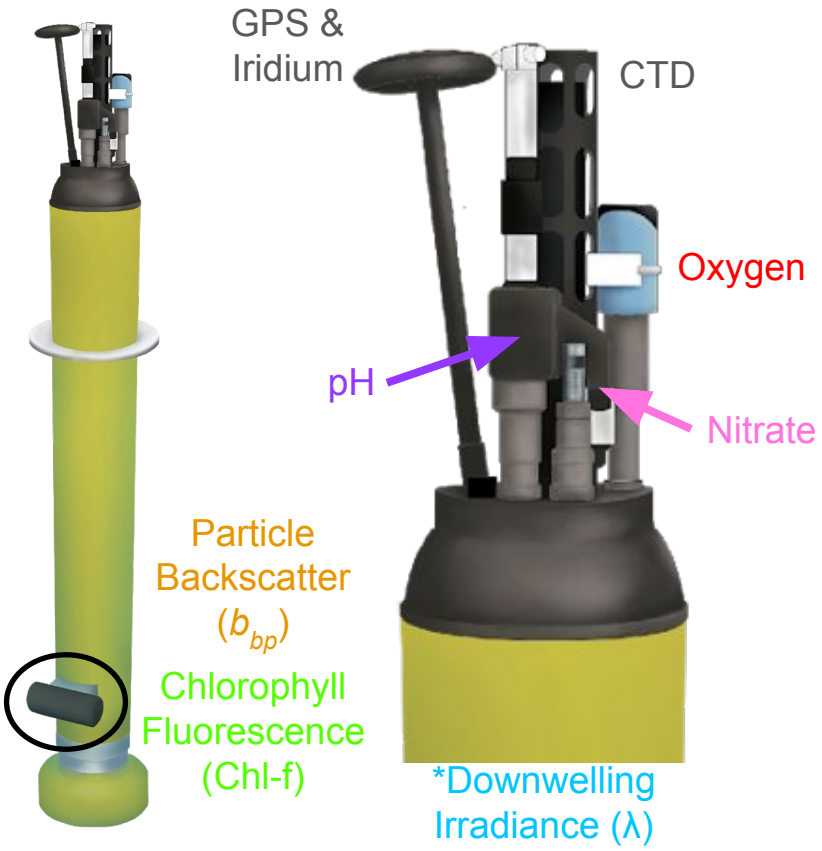


Float image credit: MBARI

Derived Variables:

- dissolved inorganic carbon (DIC)
- **particulate organic carbon**
- anthropogenic carbon
- total alkalinity
- phosphate
- silicate
- pCO_2
- **Chl-a**
- Ω_{Ar}

BGC Argo: Derived Variables



Float image credit: MBARI

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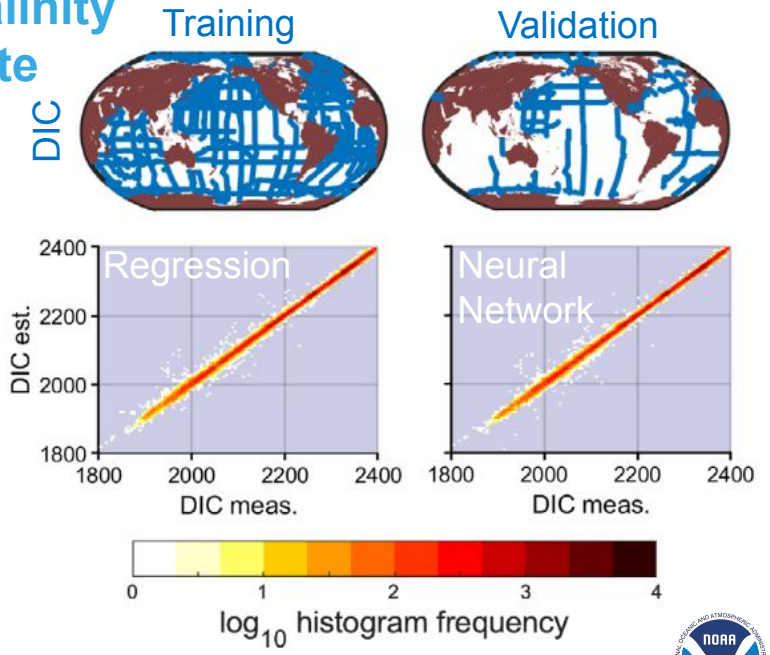


Carter et al., 2021

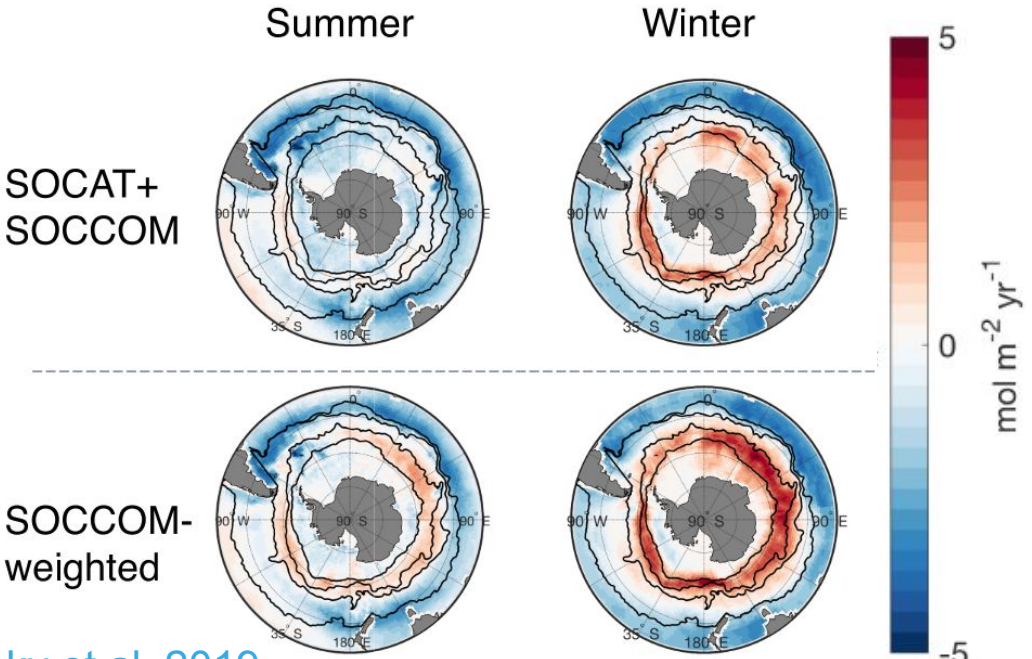
BGC Argo: Capabilities

Estimated Quantities & Data Products:

- **Air-sea carbon dioxide flux**
- Air-sea oxygen flux
- Particle size differentiation
- Gross Primary Production
- Net Primary Production
- Net Community Production
- In situ particle sinking flux
- Data constrained models

monthly
1°×1°
surface ocean

BGC float + SOCAT 2015-2017 CO_2 fluxes



Bushinsky et al. 2019

BGC Argo: Capabilities

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- Air-sea carbon dioxide flux
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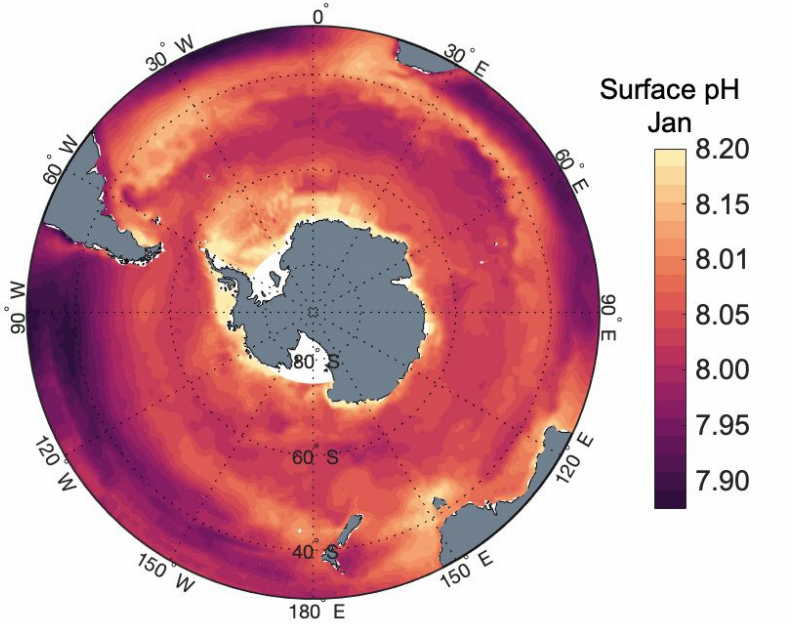
- **Data constrained models**

BGC float + B-SOSE Monthly pH Climatology



monthly
1°×1°
42 depths

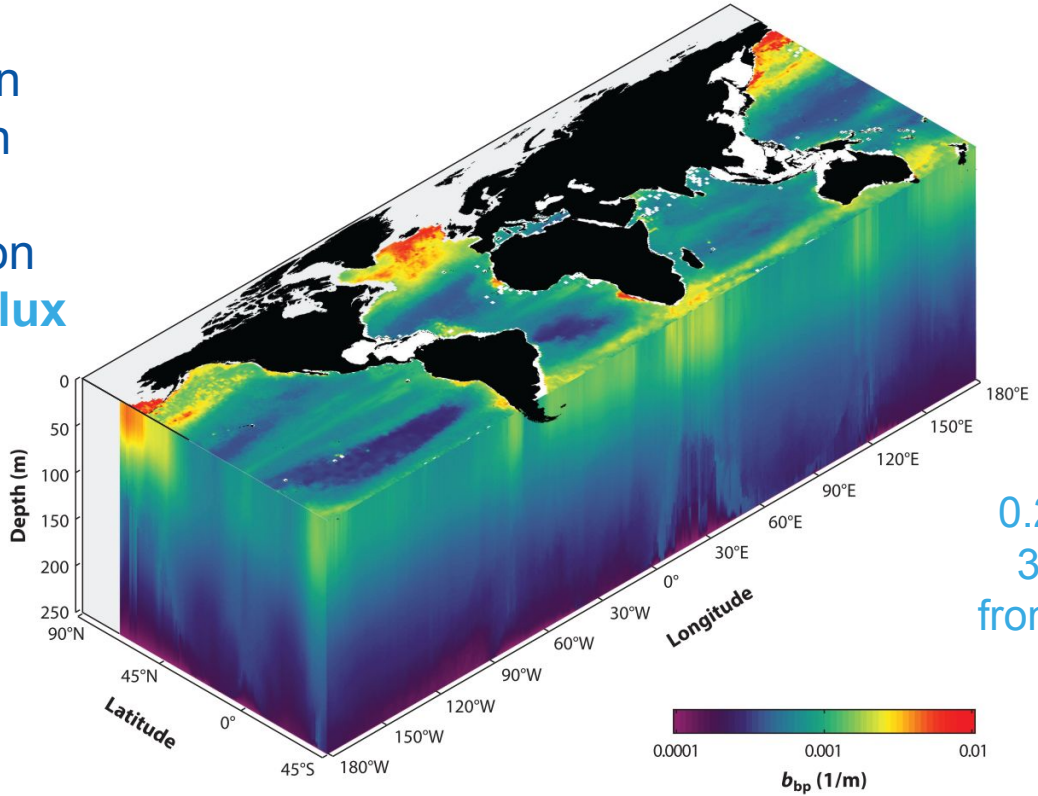
Mazloff et al., in prep

BGC Argo: Capabilities

Estimated Quantities & Data Products:

- Air-sea carbon dioxide flux
- Air-sea oxygen flux
- Particle size differentiation
- Gross Primary Production
- **Net Primary Production**
- Net Community Production
- **In situ particle sinking flux**
- Data constrained models

BGC float + Satellite
Chl-a and POC



weekly
0.25°×0.25°
36 depths
from 0-1000m

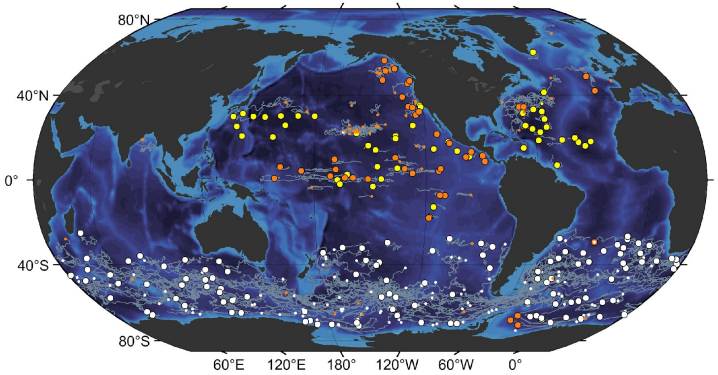
Claustre et al., 2020
after Sauzède et al., 2016

Growing the BGC Float Footprint

SOCCOM
Unlocking the mysteries of the Southern Ocean

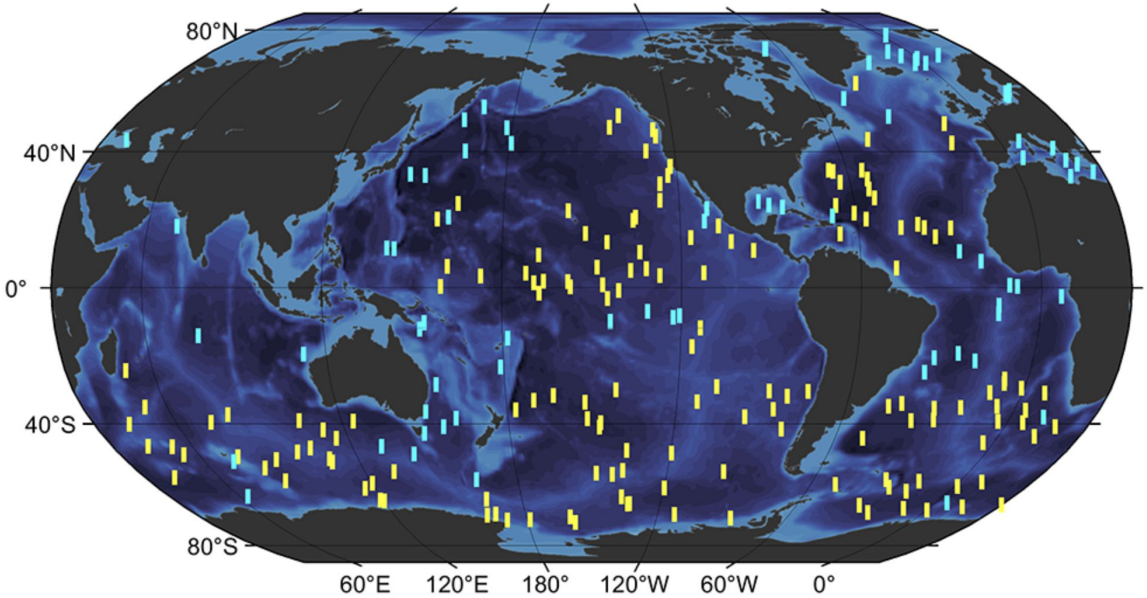
GO-BGC
Global Ocean Biogeochemistry Array

● GO-BGC ○ SOCCOM ● UW/MBARI



June 2022

4+ Sensor BGC Argo Floats
04-Jun-2022



Floats with 4 sensors: 37
Floats with 5 sensors: 162
Floats with 6 sensors: 13
MBARI floats in yellow

MBARI

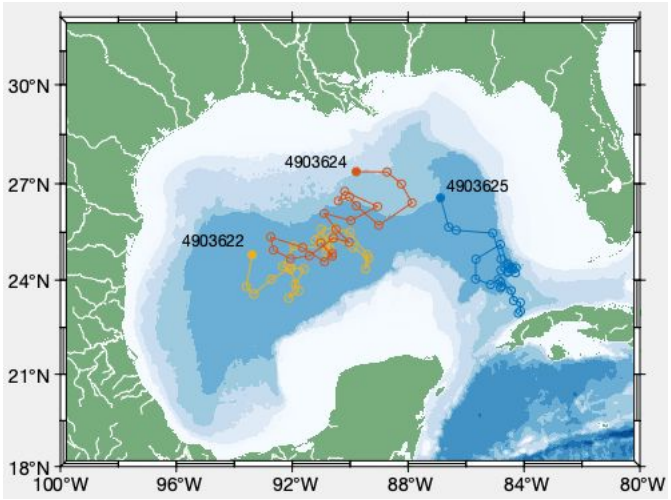
GOMO Contributions to BGC Argo

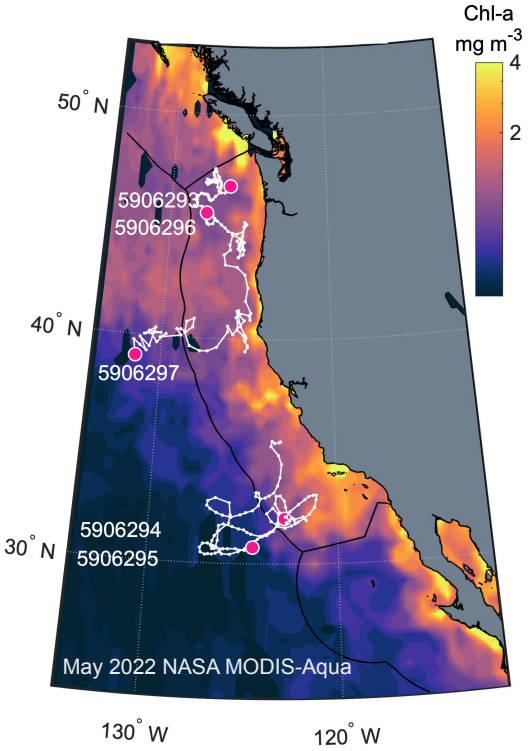
Growing NOAA Capacity

Andrea Fassbender
PMEL

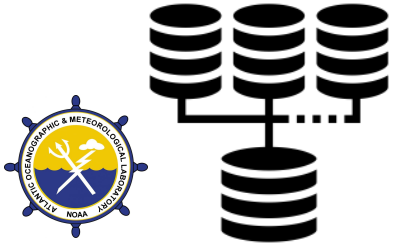
Emily Osborne
AOML

BGC Argo Pilot Arrays





US Data Assembly Center



Global Data Assembly Center
for archival and public access

GOMO Contributions to BGC Argo

Ensuring the Highest Quality Data Possible

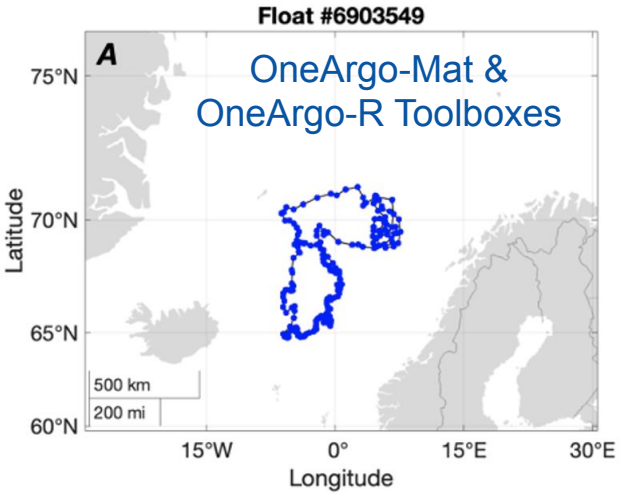
BGC property estimations used routinely in BGC sensor data quality control

Brendan Carter
CICOES/PMEL

Secondary quality control of BGC sensor data via ship-float crossovers

Seth Bushinsky
U. Hawaii

Lowering Barriers to Argo Data Access

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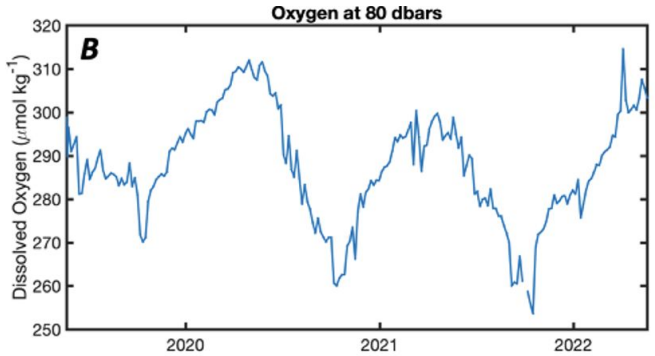
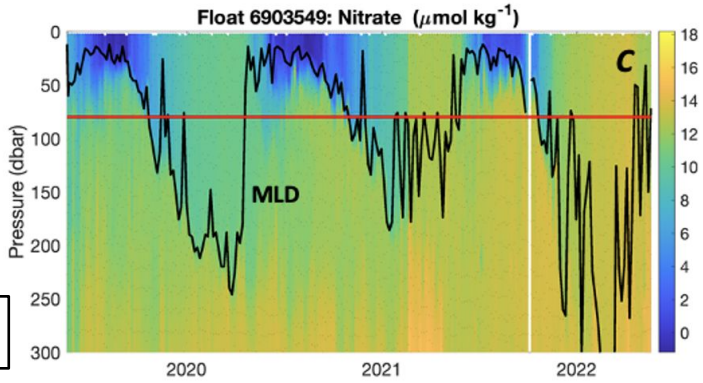
hold on; plot(ax.XLim,[80 80],'-r','linewidth',3);
```

GitHub





Ocean Carbon & Biogeochemistry

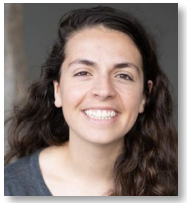
Studying marine ecosystems and biogeochemical cycles in the face of environmental change

OneArgo Toolbox (Core, Deep, & BGC)

MATLAB

Hartmut Frenzel

Jon Sharp



Nina Buzby

Andrea Fassbender

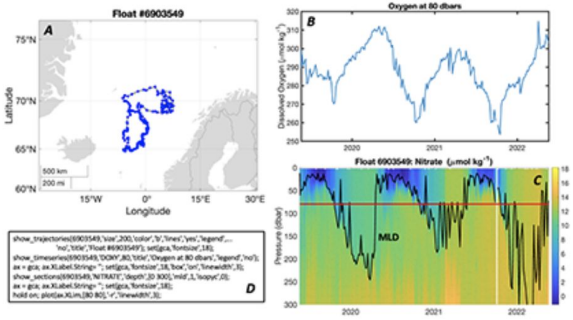
R

Yibin Huang

Marin Cornec

& colleagues

OCB Highlight

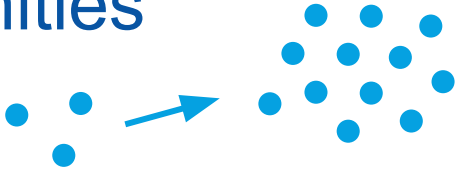


Powerful new tools for working with Argo data

No single program has been as transformative for ocean science over the past two decades as Argo: the fleet of robotic instruments that collect measurements of temperature and salinity in the upper 2 km of the ocean around the globe. The Argo program has been

Next Steps and Opportunities

implement near real-time data QC for all BGC float types

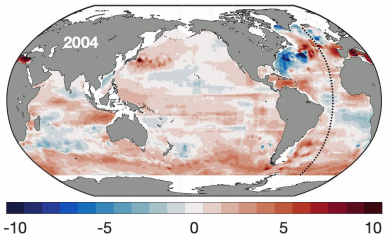


grow the CCS and GOM BGC float arrays

build capacity within the US Argo consortium

connect with NOAA fisheries, remote sensing, and carbon dioxide removal efforts

O_2 Anomaly



Annual mean dissolved oxygen anomaly at 1000 dbar [μmol kg^{-1}]

develop dynamic data products and pave the way for a BGC Argo MIP

conduct basic research

engage with modelers assimilating BGC float data

Jonathan Sharp
NOAA PMEL

Education and Outreach Opportunities

NOAA-Led Adopt-A-Float Program

*DRAFT Logo

entrain US consortium and create a national program

AOML
Community Colleges

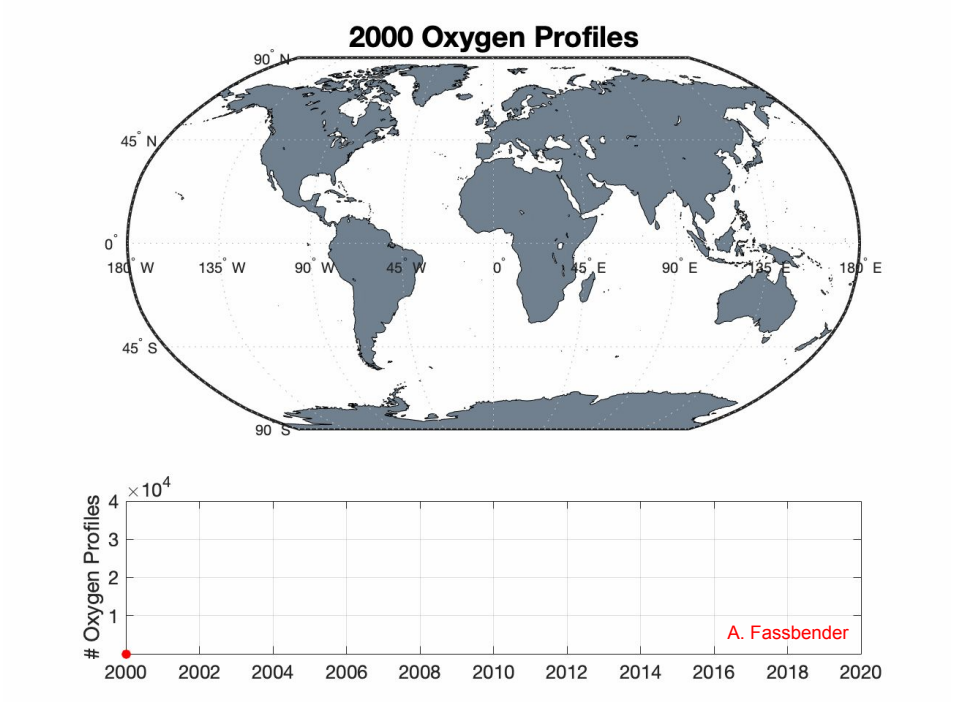
PMEL
High Schools

recruit the next generation of ocean researchers through climate education

Global Ocean Monitoring and Observing
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION

BioGeoChemical (BGC) Argo

the ocean in color



Float image credit: MBARI